

**BBSRC-FAPESP JOINT PUMP-PRIMING AWARDS for AMR
and INSECT PEST RESISTANCE IN AGRICULTURE:
*Understanding and managing resistance, including novel
methods, for pathogen and pest control.***

PARTNERSHIP BUILDING WORKSHOP

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1) Description of colistin resistance in *E. coli* and *Salmonella enterica* from swine -2010-2012
6.3% of *E. coli* strains and 21% of *Salmonella enterica* strains (Morales et al, 2012).

2) Evaluation of extended-spectrum –lactamase (ESBL) in swine- 310 fecal samples from 31 herds- 2012-2014. Results:

Agent	State	Positive herds	CTX-M-2	CTX-M-15	CMY-2	CTX-M-1	TEM-1	SHV-type
<i>Escherichia coli</i>	DF, MG, PR, SP, SC, RS	11	41	8	3	1	45	14

(Silva et al, 2016)

3) Evaluation of *Enterococcus faecalis* resistant to high levels of aminoglycosides in swine- 171 fecal samples from 31 herds- 2012-2014. Results:

- HLGR- high levels of gentamycin resistance- 85,3%
- HLSR- high levels of streptomycin resistance- 96,3%
- Vancomycin resistance- 0
- Tylosin resistance 98.7 % and lincomycin 98.7 %
- Linezolid resistance- 2% - cfr+

(Filsner et al, 2017)

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- 4) Isolation of *Salmonella enterica* and *Campylobacter spp.* from pork and chicken meat in São Paulo city markets- University of Surrey/North Carolina State University /Universidade de São Paulo. 2012-2016. Antimicrobial resistance was observed in *Salmonella* and *Campylobacter* strains. (V. T. M. Gomes, 2017 and M. G. Spindola, 2017)
 - 5) Evaluation of resistance in *E. coli* from turkeys with aerosaculitis (2012)- CTXM-2 and CTXM-15 positive strains (3.5% - 8/227 strains)- (Cunha et al, 2017)
 - 6) Antimicrobial resistance in *E. coli* strains isolated from broilers raised in conventional and organic systems- Antimicrobial resistance was higher in conventional than in antibiotic-free systems (T. Knöbl, 2017).
- Extraintestinal *E. coli* carrying resistance to β -lactamases (CTX-M-2, CTX-M-55, CMY-2), Fosfomycin (FosA3), and fluorquinolones (QnrB19) in poultry- (Cunha et al, 2017)

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- 7) Use of antimicrobials in swine herds in Brazil: Critical analysis and impact on epidemiological markers of resistance (M. C. Dutra, 2017)- preventive use only
- 25 swine herds, nine states (150 to 15 000 sows, total of 61 410 sows).
 - Average use of 358.0 mg of different antimicrobials/kg of pig (5,4 mg to 586,0 mg)
 - Average exposure period of 66.3% animal life (2,9% to 90,4%)
 - Exposure to 7 different active principles (ranging from 2 to 11).
 - 72% use preventive medication in piglets

 - 750 samples from 25 herds (30 animals/herd) were submitted to MRSA survey - 80.0% positive herds.
 - 34,6% of 750 nasal swabs were positive to MRSA
 - All strains were LA-MRSA-ST398 with high occurrence of *czr* gene (resistance to zinc oxide and cadmium)



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Expertise:

Access to samples and herds

Bacterial isolation/identification (MALDI-TOF)

MIC determination

PFGE and AFLP typing

Gene detection- PCR

Sanger sequencing

Genome sequencing (illumina- high cost)

Genomic data analysis



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Challenges:

Evaluate the extension of this problem in Brazil

Reduction of antimicrobial use versus productivity

Awareness of the production chain

Education

The most productive swine herd evaluated in our study presented the lower antimicrobial use.